DTM30 TEMP Temperature Module

User Manual

Installation, operation, maintenance

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General Information

The DTM30 is a totally new concept in DIN rail signal conditioning and consists of a family of DIN rail modules, each one having a high degree of functionality and configurability. They accept all common signals and have a choice of output options including an isolated (0 or 4 to 20) mA re-transmission signal, change over trip relay, twin normally open relays or various combinations. For systems that require more local input, single channel versions with an in-built keypad and digital display are available where functions can be accessed via the front panel keys.

Each unit comes complete with a RS485 serial communications port which enables DTM30 to be integrated into a complete process control system. Unit wiring is simplified and speeded up by using the integral 'power / comms rail' system provided with each unit which removes the need for complicated and expensive back plane wiring.

Features

- Input/output/power isolation
- Low power, long life
- Hot plugging
- 35mm DIN rail mounting

Specification

1. Input

DTM30 units can accept the following input types.

Input	Ranges available
RTD	Pt100, Ni120
Thermocouple	K, J, T, R, S, E, F, N, B

1.1 RTD

Sensor range	-200 to 850°C
Linearization	Pt100(BS EN 60751/JISC 1604)/Ni120/Custom
Basic accuracy	0.1°C ± 0.05% of reading
Thermal drift (zero)	±0.004Ω/°C
Thermal drift (span)	100ppm/°C
Excitation current	1mA
Lead resistance effect	0.002 °C/Ω
Max lead resistance	50Ω/leg

1.2 Thermocouple

Type	**Range(°C)**
K	-200 to 1370
J	-200 to 1200
T	-210 to 400
R	-10 to 1760
S	-10 to 1760
E	-200 to 1000
F	-100 to 600
N	-180 to 1300
B	-10 to 1650
Custom	user defined

Basic accuracy	± 0.04% FS or ± 0.04% reading or ±0.5°C, whichever is greater(For type R & S, stated accuracy only applies between 800 &1760°C)(For type B, stated accuracy only applies between 400 & 1650°C)
Linearization	BS4937 / IEC 584-3 / Custom
Cold junction error	±0.5°C
Cold junction tracking	0.05°C/°C
Cold junction range	-20 to 70°C
Thermal drift (zero)	± 4μV/°C
Thermal drift (span)	± 200ppm /°C

2. Outputs

2.1 Relays

Two relay options are available, either a single changeover or twin independent relays with normally closed contacts. Contacts are Normally Closed i.e. the contact is open at power off and when operating in the absence of an alarm condition. The contact closes when an alarm is

detected.

Alarm Action	Off, High, Low, Deviation, Test
Hysteresis	Programmable 0 to 100%
Delay Time	Programmable (Alarm must be continuously present for this period in order to be recognized)
Start-up Delay	Programmable

	AC	**DC**
Max switching voltage	48V RMS	48V
Max current	1A @48V	1A @ 30V
Max power	60VA	30W
Operate time	<5ms	
Electrical life @ full load	100,000 operations	
Mechanical life	10,000,000 operations	

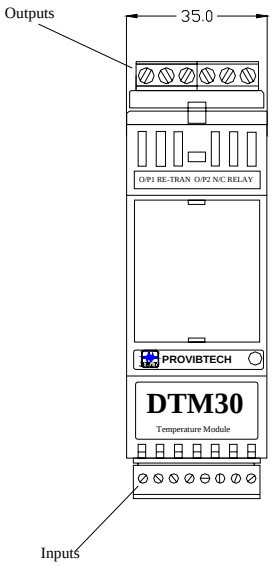
2.2 Current Retransmission

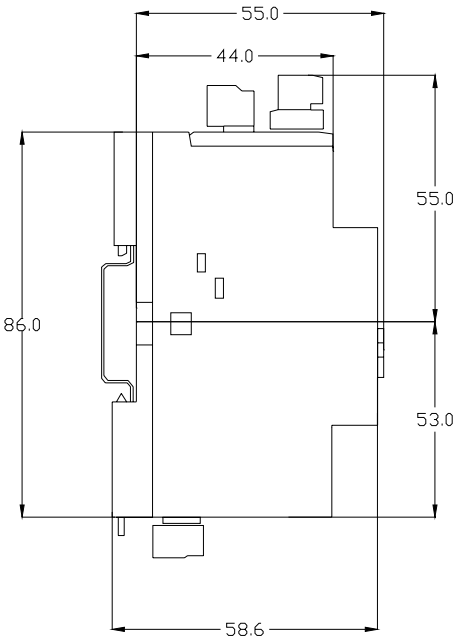
Output Range	0-10, 0-20, 4-20 mA source or sink
Maximum current output	<23mA
Accuracy	0.07%
Max power supply	30V (In sink mode)

3. General

EMC Approval	EN61326: 1997
Immunity	Annex A Industrial
Response Time	300mSec typical
Power Requirements	24V DC ±10% @200 mA
Isolation	500V AC I/P~O/P~PSU
Ambient operating range	-30 to 60°C
Ambient storage	-50 to 85°C
Ambient humidity	10 to 90% RH
EMC emissions	BS EN50081-1
EMC immunity	BS EN50082-2
Display Range	-1999 to 9999

Case Dimensions（mm）





Ordering information

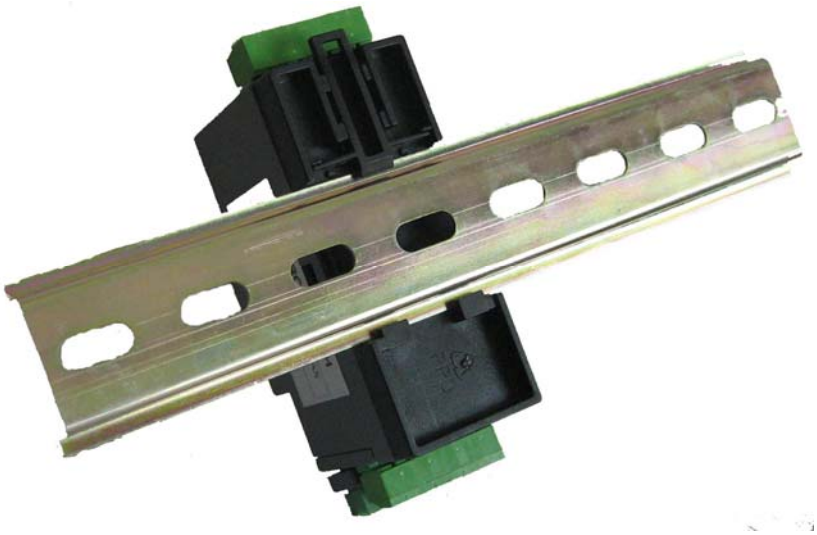
DTM30-AX

A0：Basic module

DTM30 Installation

DIN Rail Mounting

35mm DIN rail mounting

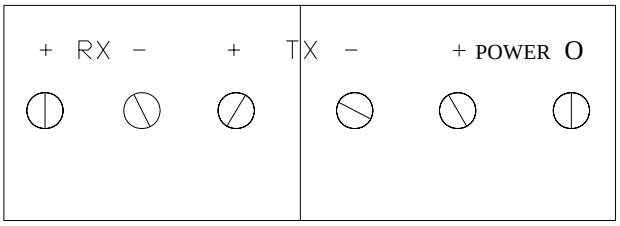


Care must be taken when installing units into an enclosure to ensure that the ambient temperature range is not exceeded. Power supply units can produce heat and if possible are best mounted in a separate enclosure away from the DTM30 units.

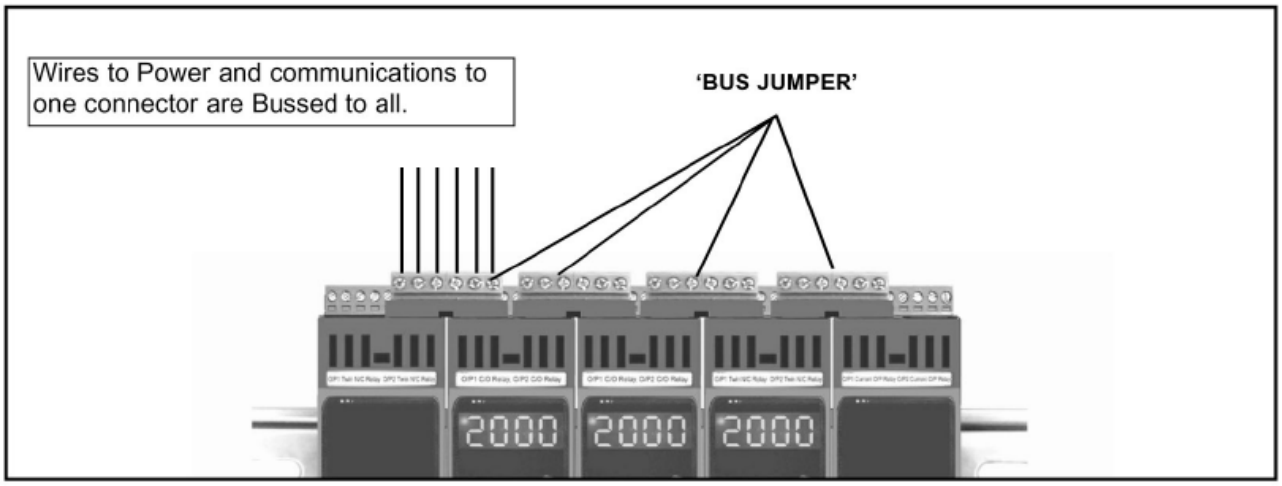
DTM30 Operation

Wiring Diagram

1. **Power / Comms**



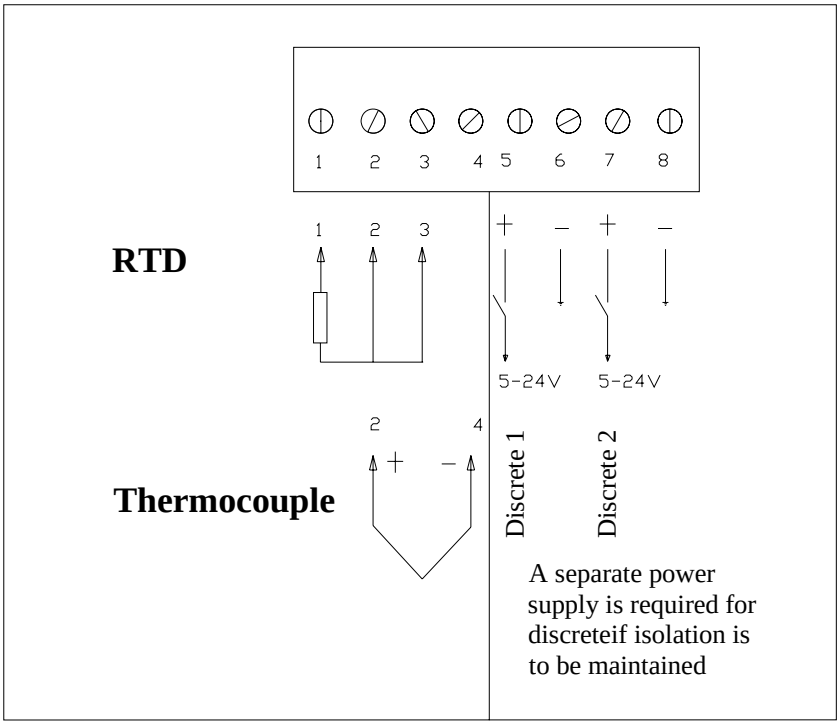
DTM30 is provided with a unique 'BUS JUMPER' system for quick wiring of communications and power connections. To use the Bus Jumper, disconnect all power supply/communications connectors and place them so that they connect between the two units. Wiring to one connector then connects to all units.



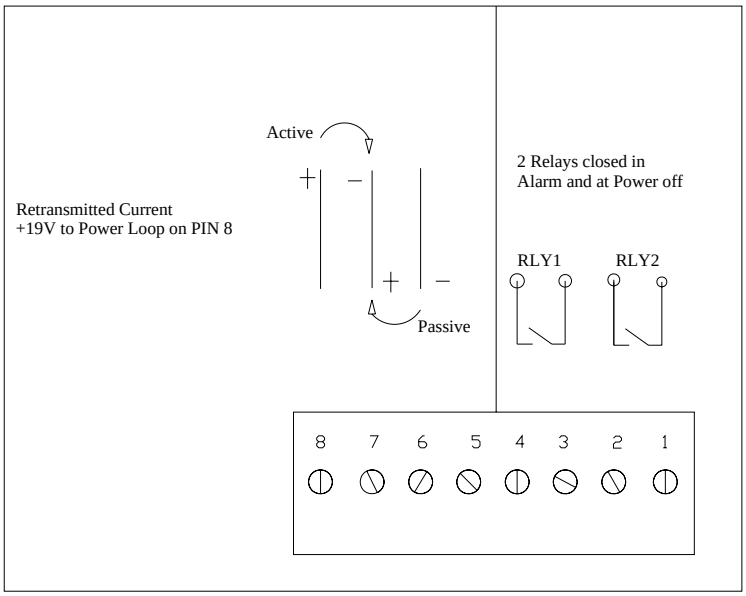
Ensure that the power supply is correct for the application. Over-voltage could damage the instrument.

Ensure that the exposed section of the wire is fully inserted and that no loose strands are exposed.

2. Inputs



3. Outputs



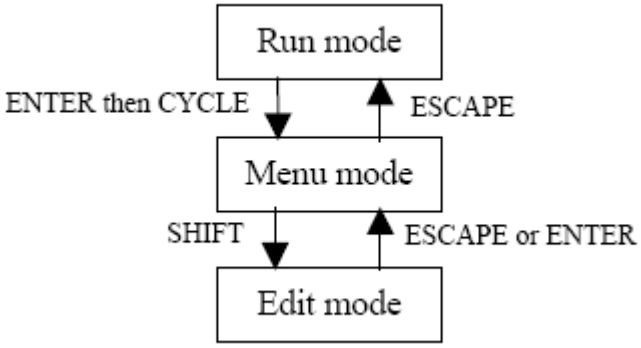
DTM30 Menu Programming

1. Operating Modes

All single channel DTM30 has 3 operating modes. These are:

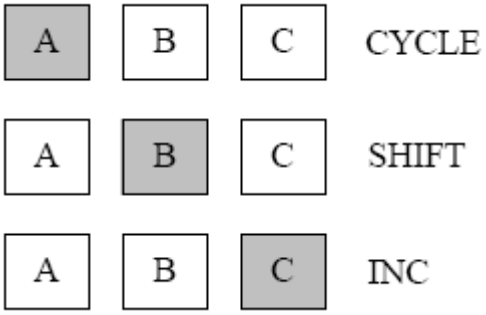
- Run Mode – Process Variable is displayed.
- Menu Mode – Enables navigation around menu structure.
- Edit Mode – Enables menu parameters to be edited.

Run mode is the principal mode of operation. The other two modes are accessed as shown in the following diagram.

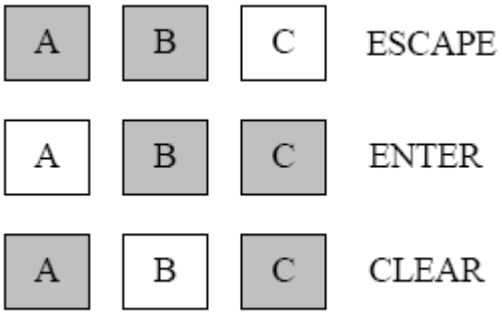


2. Key Press Definitions

Each DTM30 unit has 3 keys (A, B & C) to enable menu programming. Each key pressed individually produces the following menu action (shaded square signifies key pressed):



Keys pressed simultaneously produce the following menu actions (shaded square signifies key pressed):

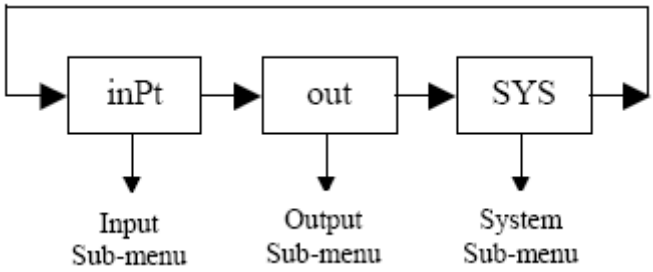


A: red key, B: green key, C: blue key.

3. Entering Menu Mode

On power up, the unit(s) will take a few seconds to configure itself. Run mode will then automatically be entered. Menu mode is accessed from run mode by pressing ENTER followed by CYCLE. The user will then be able to move around the root menu.

4. Root Menu



5. Navigating Around the Menu

The user can navigate around the root menu (or any sub-menu) by pressing the CYCLE key. Menu navigation wraps around at the end of the menu list. The items displayed in the menu can either be submenus, parameter lists or numbers

6. Entering a Sub-Menu

Pressing SHIFT enters the sub-menu or enables parameter list/number editing, depending on where the menu structure is currently being pointed. If the menu navigation is pointing at a

sub-menu, the subsequent sub-menu can then be cycled around using the CYCLE key.

7. Editing a Parameter List

A parameter is selected from a list of options. The parameter option list can be cycled through by pressing the INC key. The user will be able to distinguish between a menu cycle action, and a parameter list cycle action by having the following 2 dynamic display styles:

Action	Display Style
Menu Cycle	Display scrolls on cycle press, no flash
Parameter List Cycle	Flash display at 1Hz

While the display is flashing, the option on the display has not been saved to memory. When the desired parameter option is in view, pressing the ENTER key will save it to memory. The display will stop flashing for 1 second to confirm the selection, before returning to the previous sub-menu. Waiting for 1 minute without a key press, or pressing the ESCAPE key will return the user to the previous submenu, without saving the selection.

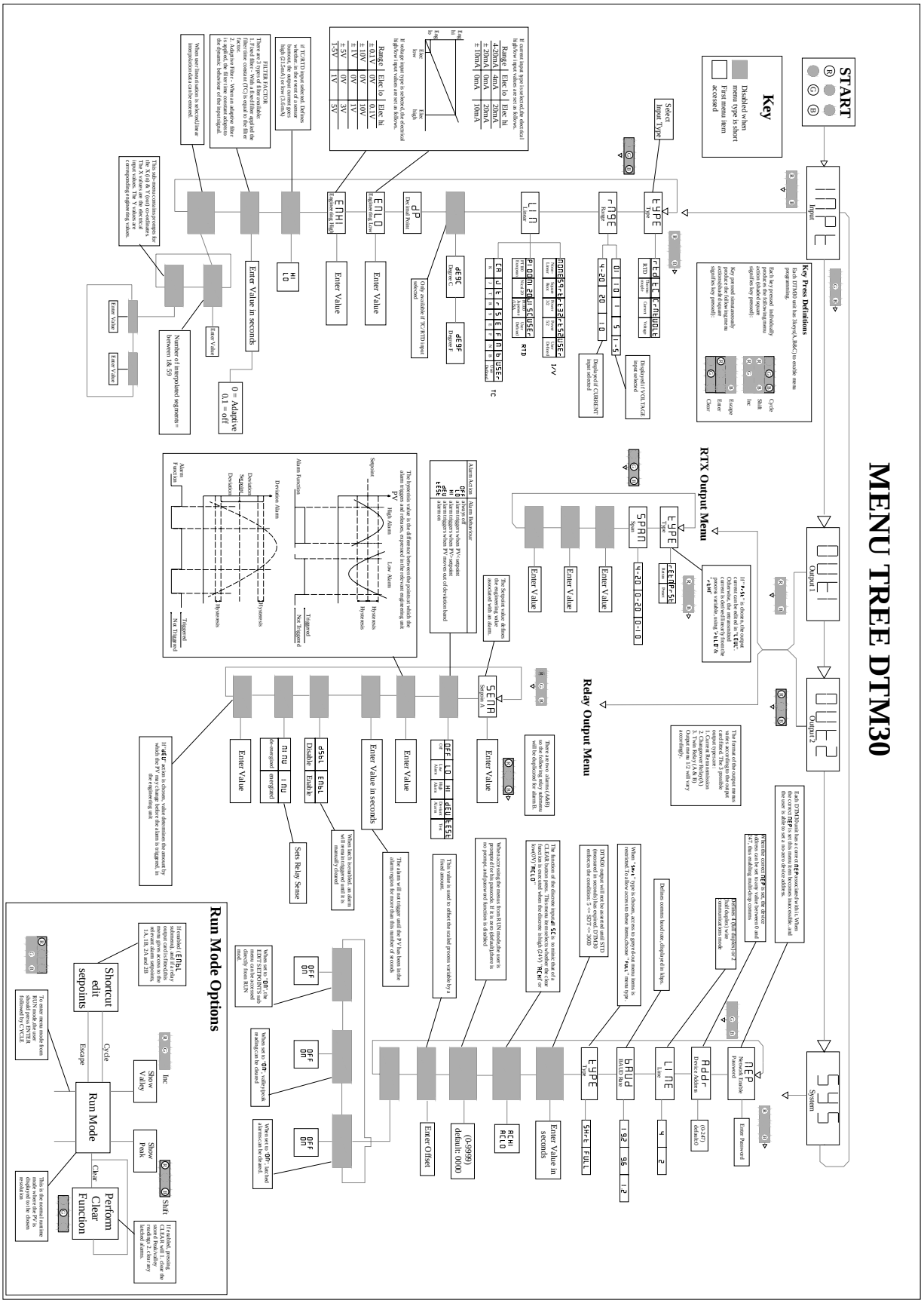
8. Editing a Number

A number is edited by incrementing each digit in turn. The user will know which digit is currently selected for incrementing by the flashing (@1Hz) of that digit. Pressing the INC key will increment the digit. On overflow, the digit will wrap around to '-' or '0', whichever is applicable. Pressing SHIFT will shift the currently selected digit right one place. If the number is a whole number, pressing SHIFT when the right most digit is selected will wrap the selection around to the left most digit, and the process starts again.

While the display is flashing, the number on the display has not been saved to memory. When the desired number is in view, pressing the ENTER key will save it to memory. The display will stop flashing for 1 second to confirm the saved number, before returning to the previous sub-menu. Waiting for 1 minute without a key press, or pressing the ESCAPE key will return the user to the previous submenu, without saving the number.

9. Menu Structures

This following describes the menu tree structure through the use of a tree-diagram.


MENU TREE DTM30
START
Key
Key Press Definitions
Run Mode Options
RTX Output Menu
Relay Output Menu

10. Select Menu Type

When “SHRT” type of the “TYPE” under the “SYS” menu is chosen, access to greyed out menu items is restricted. To allow access to these items, choose “FULL” menu type.

11. Set Input Type

In the “TYPE” under the “INPT”, the user can set input type(RTD,Thermocouple).

12. Set Input Linear

In the “LIN” under the “INPT”, the user can set input linear.

- RTD: PT100 European, Nical 20, Pt100 Japenese/USA, User Defined;
- Thermocouple: K, J, T, R, S, E, F, N, B , User Defined.

13. Set the Temperature Unit

In the “UNIT” under the “INPT”, the user can set the temperature unit to degree C or degree F.

14. Set Output Current

In the “SPAN” under the “OUT1”, the user can set output current (4-20 mA, 0-20 mA, 0-10 mA).

15. Set Full Scale

In the “RTLO” under the “OUT1”, the user can set full scale low;

In the “RTHI” under the “OUT1”, the user can set full scale high.

16. Set Relay Alarm

- In the “ACT” under the “OUT2”, the user can set alarm action(off, low alarm, high alarm, test);
- In the “SET” under the “OUT2”, the user can set alarm setpoint;
- In the “HYS” under the “OUT2”, the user can set alarm hysterisis;
- In the “DEL” under the “OUT2”, the user can set alarm delay;
- In the “LCH” under the “OUT2”, the user can set alarm latch;
- In the “INU’ under the “OUT2”, the user can set relay energized/de-energized;
- In the “DEU” under the “OUT2”, the user can set alarm deviation.

17. Set Startup Delay Time

In the “STRT” under the “SYS”, the user can set startup delay time.

DTM30 Maintenance

Introduction

This section describes how to test whether the DTM30 is normal work.

Regular Maintenance

Recommend once maintenance of DTM30 one year. In addition, according to the actual situation users should shorten the maintenance interval.

Preparation

Detect DTM30 required the following tools:
process calibrator;
Potentiometer;
Multimeter;
24VDC power supply;
Wire.

Test

1. RTD test:

Connect the potentiometer to DTM30, detected whether the output current and display is in the range of permit.

The respective accuracies of the three main specification types, BS.EN 60751 Class A, BS.EN 60751 Class B and 1/10th Class B. Pt100 Platinum Resistance sensors are as shown in the tolerance table below.

Resistance at 38.51 ohms fundamental interval			Tolerances for 100 ohms Thermometers					
Temperature			Class A		Class B		1/10 Class B	
℃	℉	ohm	±℃	±ohm	±℃	±ohm	±℃	±ohm
-200	-328	18.52	0.55	0.24	1.3	0.56	0.13	0.06
-100	-148	60.26	0.35	0.14	0.8	0.32	0.08	0.03
0	32	100.00	0.15	0.06	0.3	0.12	0.03	0.01
100	212	138.51	0.35	0.13	0.8	0.30	0.08	0.03
200	392	175.86	0.55	0.20	1.3	0.48	0.13	0.05

300	572	212.05	0.75	0.27	1.8	0.64	0.18	0.06
400	752	247.09	0.95	0.33	2.3	0.79	0.23	0.08
500	932	280.98	1.15	0.38	2.8	0.93	0.28	0.09
600	1112	313.71	1.35	0.43	3.3	1.06	0.33	0.10
700	1292	345.28			3.8	1.17		
800	1472	375.70			4.3	1.28		

2. Thermocouple test:

Connect the process calibrator to DTM30, detected whether the output current and display is in the range of permit.

DTM30 Default configuration

There is a reset button on the underside of every DTM30 unit, accessible with a small screwdriver via the lower case vents. In order to reset all configuration settings, this button must be pressed with power off, then remain pressed for 1 second after power-on. This will reset almost all configuration settings to their default states, as the following sections show. Any configuration setting not listed here will be unaffected when performing a reset. A reset is irreversible, and must be performed with caution.

1. General Configuration

Discretes active level: high
Clear peak / valley: disabled
Clear latched alarms: disabled
Edit setpoints: disabled
Menu type: short
Display resolution: 1 decimal place

2. Input(s) Configuration

Each of the following applies for each input channel.
Input type: RTD
Linearization type: Pt100(BS EN 60751)
Input unit: Degree C
Filter factor: 0.1 (i.e. no filter applied)
Burnout: Low

3. Outputs Configuration

Output startup delay: 5 seconds
Each of the following applies to each alarm/relay output.
Setpoint: 50/75℃
Hysteresis: 2℃
Deviation: 0
Alarm delay: 3s
Alarm action: High alarm

Latch configuration:	latched
Alarm-relay:	de-energized
Each of the following applies to each retransmitted current output	
Retransmission type:	Retransmission (not preset)
Span:	4-20mA
Full scale low/high:	0/100℃
Preset level:	10mA (This level will only be applied when ‘preset’ type is selected)